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Blastocystis Sp: a Neglected Zoonotic Protozoan

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ABSTRACT

The significance of *Blastocystis* as a cause of human and animal disease remains unknown. It has been suggested that the organism is zoonotic. This study was undertaken to determine the prevalence of *Blastocystis* sp in stray dogs, which may be implicated as a reservoir for human infection.

During the period April-September 2007, 50 stray dogs were collected from different parts of urban Sari, in Mazandaran Province, Iran. They were immediately transported to Sari Medical School, where they were necropsied; the gastrointestinal tract was opened completely and searched for *Blastocystis* sp The specimens were examined by wet mount and formalin-ether concentration methods.

Blastocystis sp were found by light microscopy in 14 (28%) of 50 fecal samples from the youngest (2 months) to the oldest (4 years) dogs in this study. Six of 21 male (28.6%) and 8 of 29 female (27.6%) dogs had *Blastocystis* sp in their fecal matter. No correlation between the presence of *Blastocystis* sp and the age or sex of the host was found in dogs studied. The high prevalence of the organism in dogs indicates that stray dogs may be an important source of *Blastocystis* sp infection for humans.

Keywords: *Blastocystis* sp, protozoan, zoonosis, human health, parasite, dog

Introduction

Blastocystis sp is an anaerobic protozoan that occurs in the intestines of humans and other mammals [1]. *B. hominis* has been traditionally regarded as a non-pathogenic parasite of humans. The pathogenic potential of *B. hominis* has been reported in the literature since 1899 [1], and studies reporting its association with human disease have been increasing [2-9]. Pathogenicity appears to be related to the numbers of parasites. Reports of symptomatic individuals with fewer than five parasites per ×400 field have been documented. More severe symptoms have been noted with increased numbers of parasites [6,10].

Many *B. hominis*-like organisms have been isolated from various animals, especially from many species of birds and mammals [11-18]. Salim *et al* [19], in a study of *B. hominis* among humans, showed that animal handlers had significantly higher rates of infection than normal healthy individuals who did not work with animals. The presence of zoonotic strains isolated from a chicken and a guinea pig has shown the transmissibility of the organism between humans and animals [20,21].

Although there are few reports of *Blastocystis* sp from cats and dogs [22-24], there is no report of *Blastocystis* sp from dogs in Iran; this study was

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undertaken to determine the prevalence of *Blastocystis* sp in stray dogs, which may be implicated as a reservoir for human infection.

Materials and methods

Study area

Samples were taken in 7 different regions of Sari; this city, in the center of Mazandaran Province, northern Iran, has a population around 196,000 and lies between the parallels 35°58' and 36°50' north, and 52°56' and 53°59' east. The mean annual relative humidity is 85.83%, with rainfall in all seasons, and an average temperature of 17°C.

Collection and examination of dogs

During the period April-September 2007, with the approval of the Ethics Committee of Mazandaran University of Medical Sciences, 50 juvenile (< 6 months) and adult (> 6 months) stray dogs (males 21; females 29) were shot and collected from different urban areas in Sari city, Mazandaran Province, Iran. They were transported immediately to Sari Medical School, where they were necropsied and the gastrointestinal tracts opened along their entire length. The mucosa, scraped with a scalpel, and fecal specimens, were examined by formalin-ether concentration method.

Statistical analysis

Statistical analysis used SPSS 15. Chi-square testing was used to assay the prevalence of *Blastocystis* sp relative to host age and gender.

Results

A total of 23 juvenile and 27 adult stray dogs were examined for the presence of *Blastocystis* sp Evaluation of the feces samples indicated that, overall, 28% of dogs were infected with at least one *Blastocystis* sp.

There was no significant different in the overall prevalence by gender (males 6/21 = 28.6%; females 8/29 = 27.6%) (Table 1).

With respect to the ages of the dogs, 6/23 (26.1%) of juvenile dogs and 8/27 (29.6%) of adults were infected with *Blastocystis* sp There was no statistically significant association between *Blastocystis* sp and age range among the stray dogs (Table 2).

The distribution of the positive dogs over the locality indicated that differences in terrain did not influence infection rates.

Table 1 Prevalence of *Blastocystis* sp in stray dogs, by sex..

Sex	Positive No. (%)	Negative No. (%)
Male	6 (28.6)	15 (71.4)
Female	8 (27.6)	21 (72.4)
Total	14 (28.0)	36 (72.0)

$P > 0.05$; df = 1; $\chi^2 = 0.006$

Table 2 Prevalence of *Blastocystis* sp in stray dogs, by age.

Age group	Positive No. (%)	Negative No. (%)
Juvenile	6 (26.1)	17 (73.9)
Adult	8 (29.6)	19 (70.4)
Total	14 (28.0)	36 (72.0)

$P > 0.05$; df = 1; $\chi^2 = 0.077$

Discussion

Although *Blastocystis* studies started in the early 20th century [25,26], the significance of this protozoan as a cause of human and animal disease remains unknown. It has been suggested that the organism is zoonotic [27], but there is insufficient evidence to either support or refute this.

This study, the first epidemiological survey of *Blastocystis* in dogs in Iran, found that 28% of dogs were infected with at least one *Blastocystis* sp. This parasite has been reported in the feces of a number of economically important animals, including cattle and pigs [11,14,28,29]. Several studies have determined prevalence rates in large numbers of animals [11,14,28]. Data on the presence of this organism in cats and dogs are extremely limited [22-24]. A high prevalence (70%) was found in the feces of the dogs and nearly 70% of cats examined in Australia [23]. In contrast, no *Blastocystis* sp were found among dogs and cats in Germany, Malaysia and Japan

[15,24,30]. It is unclear why the prevalence varies, but one explanation may be the housing conditions of the animals. Abe *et al* [24] reported that carnivores and herbivores, including lions, camels, deer, and hares, housed in a city zoo, were not infected with *Blastocystis* sp. Meanwhile, circus animals that were housed together, or caged close to other animals, were found to be infected, and the infection could have been transmitted within circus animal facilities [29]. It is important to consider the sanitary conditions of animals in epidemiological surveys; generally, the prevalence of *Blastocystis* sp infection among stray animals, such as dogs and cats, is high. Blastocystis organisms were identified microscopically by direct examination of fecal samples. This parasite is very fragile, so that detection using this method alone requires immediate collection and a relatively large number of organisms. As a result, it appears that in many studies its prevalence is higher than the present data indicate. No relationship was found between the presence of *Blastocystis* sp. in dogs and urban area, or dog sex or age. The prevalence of the organism appears similar in juvenile and adult dogs of both sexes. Duda *et al* [23] showed that sex- and age-related differences were insignificant.

Although Duda *et al* [23] showed that nuclear morphology does not appear sufficiently distinctive to allow differentiation between *Blastocystis* sp from dogs and *B. hominis* from humans, Yoshikawa *et al* [31] reported that all animal isolates classified into the known genotypes appeared zoonotic, and may possess zoonotic potential.

In conclusion, regarding possible zoonotic transmission, a *Blastocystis* sp prevalence rate of 28% in dogs indicates that stray dogs may be an important source of infection for domestic dogs and humans. Therefore, animal health and human health education are recommended in these communities. Veterinarians and physicians should play an important role in increasing the level of awareness of zoonotic dog parasites, thus helping prevent or minimize zoonotic transmission.

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